



Alfred Schurmann

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**Amendments to the claims, in response to the Examination Report dated 9/22/2005****Claim listing**

The changes to the previous versions are marked as follows: (i) the deleted text is shown by strike-through except that double brackets [[ ]] placed before and after the deleted text are used if the deleted text has 5 or fewer characters, (ii) new text is underlined.

What is claimed is:

Claim 1 (currently amended). A method for establishing emotions in a robot or agent system, denoted by Pd and called in short robot/agent, which comprises: (i) a set of needs, (ii) models of object and situations which can occur in the surrounding of Pd, (iii) a set of activity schemas, or in short activities, which Pd can execute, and (iv) a sub-system for recognizing objects and situations.

said method comprising:

(a) establishing intensities of satisfactions and desires with regard to said needs as primary emotion intensities of Pd, where a satisfaction and desire concerns one need;

(b) establishing ~~Representation of~~ stimulus patterns in ~~said descriptions of objects, situations, object and situation models,~~ and activities [[. ]], where ~~a The form of said stimulus pattern patterns-~~ concerns one need and shows the expected changes of intensities of satisfaction and desire with regard to said need, in a time period;

(c) calculating stimulus intensity of an object or situation using  
said stimulus patterns connected with the model of said object or situation, and  
the current intensities of satisfactions and desires with regard to the needs connected with these stimulus patterns;

(d) calculating expected intensities of satisfactions and desires of Pd, at present and in the future. The method for determining intensity of expected satisfaction ( $bes(Pd, b, ta + i * q)$ ) and expected desire ( $des(Pd, b, ta + i * q)$ )  
[[. ]], with respect to the needs occurring in the ~~a need b,~~ by these stimulus patterns [[. ]], connected with  
an object or a situation, when this object or situation has been recognized by Pd; and

(e) calculating the current intensities of the following emotions of Pd The use of said stimulus patterns to :

~~\* determination of intensity of expected stimulus of an object, of a situation or of an activity (OSA);~~

~~\* representation of intensities of the emotions:~~ contentment, joy, happiness, dissatisfaction, annoyance,  
anger, grief, pain and suffering with regard to a need of Pd ;

*A. Schurmann*

-2 of 7-

~~\* representation of intensity of expected contentment and joy when achieving of a goal is realized;~~

~~\* representation of intensity of dissatisfaction, disappointment and anger when obstacles make difficult to realize achieving a goal (a goal situation) or when a goal has not been achieved;~~

~~\* representation of intensities of positive emotions such as [[ ( ) ] ] liking, friendship, affection [[, ] ] and love [[ ( ) ] ] , and negative emotions such as [[ ( ) ] ] dislike, annoyance, anger [[, ] ] and hate [[ ( ) ] ] to/for an object, a situation or an activity [[ OSA ] ] ;~~

~~\* representation of intensities of the emotions: desire for retaliation and revenge, and hate on/for/to an object;~~

~~frustration, depression [[, ] ] and sadness [[, ] ] with regard to a person, an object or a goal;~~

~~fear [[, ] ] of an object or a situation, fear of separation from a loved object or situation, fear of performing an activity not right, and fear of not achieving a goal situation;~~

~~[[hate, ] ] envy [[, ] ] at a success or a property of an other robot/agent;~~

~~jealousy [[, ] ] of an object because of a positive emotion of a person or other robot/agent towards this object;~~

~~shame; and~~

~~feeling guilt with regard to a living object or a robot/agent .~~

[[Claim ]] 2 (currently amended). [[The]] A method according to claim 1, wherein calculating the current for representing intensities intensity of [[the ]] said in (e) emotions ~~-(with respect to a need b)-~~ contentment, joy, happiness, dissatisfaction, annoyance, anger, grief, pain and suffering [[ - ]] ~~it includes~~ of the robot/agent Pd of with regard to a need of Pd comprising :

when Pd has recognized that the intensities of satisfaction and desire with regard to said need have changed,

updating the intensity of said emotions using ~~\* the intensities of these feelings of Pd (at time t) are given~~

~~by function values (e.g. by  $zful(Pd, b, t)$ ), where Pd denotes a human, a mammal, a virtual human or mammal in a software system, or an agent system (e.g. a robot);~~ ~~\* the intensities of said emotions change when: (i)~~

~~Pd perceives values of satisfactions ( $bef(Pd, b, ta)$ ) and desires ( $des(Pd, b, ta)$ ) by senses or sensors; the last~~

value of the intensity of said emotions and the said changes of intensities of satisfaction and desire;

*A. Schumann*

-3 of 7-

when Pd has recognized ~~(ii) Pd perceives~~ an object  $[[ , ]]$  or a situation, ~~or an activity (OSA)~~, updating the intensity of said emotions using:

the last value of the intensity of said emotions,

said in (b) stimulus pattern connected with the recognized object or situation, with regard to said need,

and the intensities of satisfaction and desire with regard to said need; and

when Pd has recognized ~~(iii) Pd perceives~~ that it ~~he/she~~ is achieving or cannot achieve his/her ~~its~~ goal or intermediate goal situation ~~or that he/she cannot achieve the goal situation;~~, updating the intensity of said emotions using:

the last value of the intensity of said emotions,

said in (b) stimulus pattern connected with said goal or intermediate goal situation, with regard to said

need, and

the intensities of satisfaction and desire with regard to said need.

\* ~~said, in Claim 1, stimulus patterns are associated with a goal situation, in the list of current goals;~~

\* ~~representation of intensity of contentment and joy when Pd realizes achieving a goal;~~

\* ~~representation of intensity of dissatisfaction, disappointment and anger when obstacles make difficult to~~

~~realize achieving of a goal situation or of an intermediate goal, or when Pd has not achieved his/her goal.~~

**Claim 3** (currently amended).  $[[ \text{The} ]]$  A method according to claim 1, wherein calculating the current ~~for~~ representing intensities of said in (e) positive emotions  $[[ ( ) ]]$  liking, friendship, affection  $[[ , ]]$  and love  $\rightarrow$  (e.g. by  $zulieb(Pd, OSA, t)$ ), and negative emotions  $[[ ( ) ]]$  dislike, annoyance, anger and hate of the robot/agent Pd of claim 1  $[[ ( ) ]]$  (e.g. by  $abhas(Pd, OSA, t)$ ) to/for an object, a situation or an activity  $[[ (OSA) ]]$   $[[ - ]]$  comprising it includes: \* ~~the intensities of said emotions are determined by said, in Claim 1 and 2, intensities of satisfaction~~  $bef(Pd, b, t)$  ~~and desire~~  $(des(Pd, b, t))$ ; \* ~~the intensities of said emotions change~~

when Pd has recognized perceives that  $[[ : (i) ]]$  said  $[[ OSA ]]$  object, situation or activity has caused, supported or prevented an increase or decrease of intensities of a satisfaction intensity with regard to a need of Pd  $(bef(Pd, b, t))$  or desire  $(des(Pd, b, t))$ ; updating the intensities of said positive and negative emotions using the last values of these intensities, and the intensities of satisfaction and desire with regard to

*R. Schumann*

-4 of 7-

said need; and

when Pd has recognized that said object, situation or activity has ~~-(ii) OSA~~ realized, supported or prevented achieving a goal(- a goal situation [[ ). ]], updating the intensities of said positive and negative emotions using:

the last values of these intensities,

said in (b) stimulus patterns connected with said goal situation, and

the intensities of satisfactions and desires with regard to the needs occurring in said stimulus patterns.

[[Claim ]] 4 (currently amended). [[The ]] A method according to claim 1, wherein determining the current intensities of said in (e) emotions for representing intensity of desire for- retaliation and revenge , and hate of the robot/agent Pd of [[on ]] on/for/to an object [[ (Ob) -]] ~~it includes comprising :~~

establishing the need of Pd for retaliation and revenge on said object, and the intensities of satisfaction and desire with regard to said need for retaliation and revenge, when the intensity of said in (e) negative emotions of Pd to this object is great:

updating the intensities of satisfaction and desire with regard to said need for retaliation and revenge using the last and the current intensities of the negative emotions to said object; and

~~\* said intensity of desire for retaliation and revenge change when said, in Claim 3, intensities of negative or positive emotions to/for said Ob increase or decrease;~~

~~\* the intensity of said feeling is determined by said, in Claim 3, intensity of negative emotions to said Ob.~~

updating the said intensity of hate for/to said object using the current intensity of negative emotions to/for this object and the current intensity of desire with regard to said need for retaliation and revenge on this object, when said intensity of negative emotions to said object has been updated.

[[Claim]] 5 (currently amended). A [[The]] method according to claim 1, wherein calculating the current for representing intensities of said in (e) [[ the]] emotions frustration and depression , and sadness with regard to

*N. Schumann*

-5 of 7-

a person, an object or a goal situation of the robot/agent Pd of comprising ~~[[ - ]] it includes~~ ~~[[ : ]]~~

updating said intensities of frustration and depression using the current said in (e) intensity of emotions

~~\* — intensities of said emotions are determined by: (i) said, in Claim 2, intensities of contentment, joy, happiness, dissatisfaction, annoyance, anger, grief, pain and suffering with regard to all needs of Pd ; and~~

updating said intensity of sadness using said in (c) ~~(ii) said, in Claim 1~~ ~~[[ , ]]~~ intensity of stimulus of ~~[[ an ]]~~ said person, object, [[ of a ]] or goal situation or of an activity, OSA, , and the current intensity of emotions contentment, joy, happiness, dissatisfaction, annoyance, anger, grief, pain and suffering with regard to all needs of Pd.

~~[[Claim ]] 6 (canceled).~~

~~[[Claim]] 7 (canceled).~~

~~[[Claim ]] 8 (currently amended). A~~ ~~[[The]]~~ method according to claim 1, wherein calculating for representing the intensity of said in (e) emotion fear , of the robot/agent Pd of claim1, of an object or a situation, of separation from a loved object or situation, of performing an activity not right or of not achieving a goal situation, [[ - it ]] ~~includes~~ ~~[[ : ]]~~ using said in (c) stimulus intensity of said object, situation, activity or goal situation, respectively, when Pd has recognized that:

it cannot avoid said object or situation with negative stimulus intensity,

it may be compelled to separate from said object or situation with positive stimulus intensity, or

it may not achieve the wished goal situation when performing an activity.

~~\* — said intensity of fear is determined by said, in Claim 1, intensity of stimulus of an object, of a situation or of an~~  
~~— activity, OSA.~~

~~[[Claim]] 9 (currently amended). A~~ ~~[[ The]]~~ method according to claim1, wherein determining the current for representing the intensity of said in (e) emotion envy [[ - it]] includes ~~of the robot/agent Pd of at a success or~~  
a property of an other robot/agent comprising

*A. Schumann*

-6 of 7-

\* ~~said intensity of envy is determined by said, in Claim 1 and 2, intensity of satisfaction ( $beff(Pd, b, t)$ ) or desire ( $des(Pd, b, t)$ ).~~

establishing (i) the following envy need of Pd „the other robot/agent should have relative small satisfaction intensity with respect to the need associated with said success or property“ and (ii) the intensities of satisfaction and desire with regard to said envy need, when the robot/agent Pd has recognized that the satisfaction intensity of the other robot/agent with regard to said need associated with said success or property is great and its own desire intensity with respect to the need associated with said success or property is great; and

calculating the current said intensities of satisfaction and desire with regard to said envy need using the current intensity of satisfaction of Pd with regard the need associated with said success or property, and the current intensity of satisfaction of said other robot/agent with regard to the need associated with said success or property, as recognized by the robot/agent Pd.

[[Claim ]] 10 (currently amended). A [[ The]] method according to claim 1, wherein determining the current for representing the intensity of said in (e) emotion jealousy [[ - ]] it includes: of the robot/agent Pd of claim 1 of an object, because of said in (e) positive emotion liking, friendship or love of a person or other robot/agent towards said object, comprising

\* ~~said intensity of jealousy is determined by said, in Claim 3, intensities of the feelings liking, sympathy, friendship and love to/for an object Ob (e.g. by  $zulieb(Pd, Ob, t)$ ).~~

establishing (i) the following jealousy need „the intensity of the positive emotion of this person or the other robot/agent towards this object should be small“, and (ii) the intensities of satisfaction and desire with regard to said jealousy need, when the robot/agent Pd has recognized that the intensity of positive emotion of the person or the other robot/agent towards said object is too great, and the intensity of positive emotion of the robot/agent Pd towards the person or the other robot/agent is not small; and

calculating the current said intensities of satisfaction and desire with regard to said jealousy need using

*R. Schumann*

-7 of 7-

the current intensity of positive emotion of the robot/agent Pd towards the person or the other robot/agent, and

the current intensity of positive emotion of the person or the other robot/agent towards said object, as recognized by Pd.

[[Claim ]] 11 (currently amended). A [[ The]] method according to claim 1, wherein for representing the calculating the current intensity of said in (e) emotion shame of the robot/agent Pd of using [[ - ]] it includes:  
~~\* said intensity of shame is determined by said, in Claim 2, the last value of the intensity of shame, and the last and the current value of said in (e) intensity of the emotions dissatisfaction, annoyance, anger, grief, pain and suffering (e.g. by  $z_{ful}(Pd, AN, t)$ ),~~ with respect to the need [[ (AN) ' ]] for recognition, acknowledgment and self-esteem [[ ' ]], when Pd has recognized that it violated some norms or rules .

[[Claim ]]12 (currently amended). A [[ The]] method according to claim 1, wherein calculating the current for representing the intensity of said in (e) emotion feeling guilt of the robot/agent Pd of with respect to a living object or a robot/agent using: [[ - ]] it includes: ~~\* said intensity of feeling guilt is determined by: (i) said, in Claim 2,~~

the last and the current values of said in (e) intensity of the emotions dissatisfaction, annoyance, anger, grief, pain and suffering (e.g. by  $z_{ful}(Pd, AN, t)$ ), with respect to the need [[ (AN) ' ]] for recognition, acknowledgment and self-esteem [[ ' ]];

~~(ii) said, in Claim 3, the intensities of said in (e) positive emotions (e.g.  $z_{lib}(Pd, PO, t)$ ) and negative emotions of the robot/agent Pd (e.g.  $ab_{has}(Pd, PO, t)$ ) towards [[ an ]] said living object [[ PO ]] or robot/agent ; and~~

the decreases of these ~~(iii) said, in Claim 1 and 2, intensity of satisfaction intensities of said living object or robot/agent which the robot/agent Pd has caused ( $bef(Pd, b, t)$ ) or desire ( $des(Pd, b, t)$ ) ;~~  
when the robot/agent Pd has recognized that it made damage to said living object or robot/agent .

*A. Schumann*